

Commentary

Ultrasound-guided continuous transverse abdominis plane block for abdominal surgery

The initial description of transverse abdominis plane (TAP) block was given by Rafi. He advocated a single point injection of local anesthetic solution in a plane between external oblique

and transversus abdominis muscle to access the abdominal wall nerves and hence provide widespread analgesia.^[1] This plane contains the innervations of anterolateral abdominal wall arising from spinal nerves T7–L1. The entry point for the TAP block is ilio-lumbar triangle of Petit which is bounded anteriorly by external oblique muscle, posteriorly by latissimus dorsi muscle and inferiorly by iliac crest. The TAP block is usually performed bilaterally, aiming to ensure a complete sensory blockade of abdominal wall. Some studies suggested 20 ml local anesthetic solution being optimal, while few others observed a limited distribution with this dosing [Figures 1 and 2].^[2]

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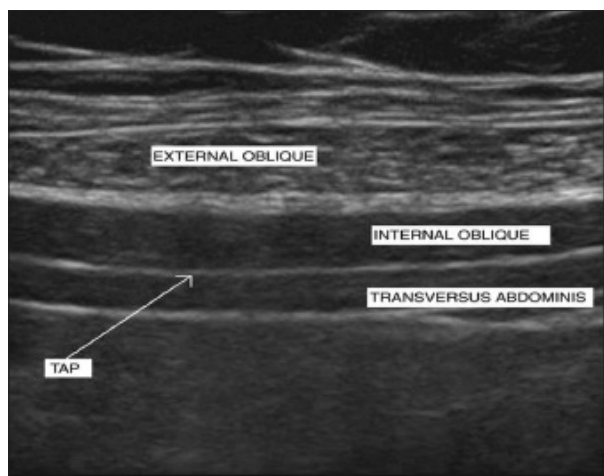


Figure 1: The transversus abdominis plane



Figure 2: Spread of local anesthetic in TAP plane (EO: External oblique muscle, IO: Internal oblique muscle, TA: Transversus abdominis muscle)

TAP block was initially described as an apparently safe procedure, but at times it may be associated with injury to viscera (liver or intestine) or nerves (femoral), more so in obese patients. Ultrasound-guided TAP block has been described to provide better localization and thus improved accuracy. There are two types of ultrasound-guided TAP blocks: Posterior and subcostal. Posterior TAP block provides analgesia to lower abdomen, while subcostal TAP block, described by Hebbard *et al.*, is effective for analgesia following upper abdominal surgery.^[3]

Ultrasound-guided TAP Block

In posterior TAP block, the ultrasound probe is placed in transverse plane to the lateral abdominal wall in mid-axillary line between costal margin and iliac crest. The needle penetrates the abdominal wall in line with the ultrasound probe and drug is deposited in the accurate plane. A recent review by Petersen *et al.* suggested that use of ultrasound can reduce the time taken for intervention, decreases the number of attempts

and increases the accuracy, and reduces the time of onset of effect and negligible possibility of accidental puncture of gastrointestinal organs.^[4] Similarly, Suresh *et al.* observed that an ultrasound-guided TAP block is a user-friendly approach in infants, children and adolescents.^[5] A catheter can also be placed in the same plane to achieve a prolonged duration of analgesia.^[6]

In subcostal block, the ultrasound probe is placed on upper abdominal wall to identify the rectus abdominis muscle. The probe is gradually moved laterally along the costal margin to identify the transversus abdominis muscle. The drug and catheter are placed in transversus abdominis plane. The placement of catheter in the appropriate plane needs precision. It is better to hydrodissect the transverse abdominis plane with 8–10 ml 0.9% normal saline and then thread the catheter in the same plane. Sometimes minimal resistance may be felt. Confirmation of the catheter placement can be done by injecting few air bubbles with 0.9% normal saline, and appearance of hyperechoic air bubbles in the plane confirms the catheter placement.^[7]

Classical TAP block can be used for lower abdominal surgeries like hernia repair, appendicectomy, abdominal hysterectomy or cesarean section. Authors have suggested the use of serial subcostal TAP block in major hepatobiliary or gastrointestinal surgery. A recent report advocates the use of subcostal TAP catheter in patients in whom epidural analgesia is either ineffective or contraindicated.

The reported duration of action in TAP block is 6–8 hours after single shot injection, while it may be prolonged in conjunction with patient controlled analgesia with morphine. Subcostal TAP catheter was used by Ozelsel *et al.* in patients undergoing elective right hepatectomy and they reported significant opioid sparing in these patients.^[8] They used intermittent boluses of 40 ml 0.2% ropivacaine every 6 hours with PCA morphine, while Harish *et al.* used the low-dose infusion via unilateral catheter in open nephrectomy patients and reported that there was no need of opioids for the next 3 days.^[9]

Sparing of dermatomes has been reported even after optimal length of catheter has been introduced. Large amount of drug to cover all dermatomes may cause local anesthetic toxicity. Often visceral pain is not relieved with TAP block. Rarely, peritoneal, hollow viscous or organ perforation, transient femoral nerve palsy, and intravascular local anaesthetic toxicity can occur.^[10]

Main advantages of TAP catheter are improved patient comfort, decreased use of opioids and hence decreased

nausea, vomiting, sedation or respiratory depression. In unilateral surgery, it can be given unilaterally. Compared to epidural block, there is absence of sympathetic or motor deficit and potential damage to the spinal cord. In this issue of the Journal, Kadam and Field have evaluated the role of ultrasound-guided continuous TAP block for abdominal surgery and observed reduction in postoperative pain scores and fentanyl requirement.^[11]

Thus, an ultrasound-guided TAP block using single injection or catheter technique allows for direct visualization of all anatomical structures, the needle, and the spread of local anesthetic, thereby increasing the safety margin and optimizing block qualities.^[12]

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